

## NATIONAL TREASURY

# A standardised tariff setting methodology

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## Contact Details

|                  |                                                                                     |
|------------------|-------------------------------------------------------------------------------------|
| Contact          | Kim Walsh                                                                           |
| Postal address   | PO Box 46830, Glosderry, 7702                                                       |
| Physical address | Ubunye House, 1 <sup>st</sup> floor, 70 Rosmead Avenue, Kenilworth, Cape Town, 7708 |
| Telephone        | (021) 671 1402                                                                      |
| Facsimile        | (021) 671 1409                                                                      |
| Cell phone       | 082 570 4565                                                                        |
| E-mail           | kim@pdg.co.za                                                                       |

|                  |                                                                                     |
|------------------|-------------------------------------------------------------------------------------|
| Contact          | Noxolo Mahlalela                                                                    |
| Postal address   | PO Box 46830, Glosderry, 7702                                                       |
| Physical address | Ubunye House, 1 <sup>st</sup> floor, 70 Rosmead Avenue, Kenilworth, Cape Town, 7708 |
| Telephone        | (021) 671 1402                                                                      |
| Facsimile        | (021) 671 1409                                                                      |
| Cell phone       | 084 944 2854                                                                        |
| E-mail           | noxolo@pdg.co.za                                                                    |

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# 1 Background and introduction

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Cost reflective tariff setting is a requirement of the Municipal Systems Act Number 32 of 2000 which states in Section 74(2) that tariffs must “*reflect the costs reasonably associated with rendering the service*”. Such tariff setting ensures that municipalities can generate sufficient revenue to fully cover their costs, sustainably deliver services to customers and invest in infrastructure that promotes local economic development.

This methodology is designed to assist municipalities to set cost-reflective tariffs for the four trading services, namely water, sanitation, electricity and solid waste removal.

The methodology follows an approach to tariff setting consistent with existing methodologies developed by SALGA, the NERSA Cost of Supply Framework for electricity, the DWS Norms and Standards for water services and the DEA guidelines for solid waste tariffs.

The methodology is accompanied by a tariff setting tool and user guide.

## 1.1 What data does a municipality need to apply this methodology?

The following data is required to implement this methodology, for the year in which the tariffs are to be set:

- Accurate data on the costs required to provide a service efficiently and effectively, with a sound system for allocating costs between services.
- Number of customers of different categories for all four services.
- Volumes sold to customers of different categories for water and electricity.
- Distribution of volumes of water and electricity sold between proposed tariff bands for each customer category, if an Inclining Block Tariff is to be considered.
- Peak electricity demand by each customer category, if available.
- Magnitude of external transfers and subsidies available.
- Magnitude of other revenues available.

Historic trends in number of customers, volumes sold and peak demand should be used if available to inform assumptions about future growth in these parameters.

In addition, strategic decisions are required on the following:

- How external subsidies (primarily equitable share) are to be allocated between services and customer categories within each service.
- How other revenue sources are to be allocated between services and customer categories within each service.
- Which services, if any, will be allowed to generate deficits, the size of deficit allowed and on which customer categories within the service the deficit will be allowed.
- Which services will generate surpluses, the size of surplus to be generated, and on which customer categories within the service the surplus will be generated.

Simple tariff setting can be conducted with less data. However, the more detailed the data the more accurately tariffs can be set to reflect the cost of service incurred for various customer categories.

The tool that accompanies this methodology has been developed so that municipalities can work through progressive levels of tariff setting based on the data available.

## 1.2 Legislation related to tariffs

The most significant piece of legislation related to tariffs is the Municipal Systems Act Number 32 of 2000. Section 74 of that Act states that:

- (1) A municipal council must adopt and implement a tariff policy on the levying of fees for municipal services provided by the municipality itself or by way of service delivery agreements, and which complies with the provisions of this Act and with any other applicable legislation.
- (2) A tariff policy must reflect at least the following principles, namely that:
  - (a) users of municipal services should be *treated equitably* in the application of tariffs;
  - (b) the amount individual users pay for services should generally *be in proportion to their use* of that service;
  - (c) *poor households must have access to at least basic services* through
    - i. tariffs that cover only operating and maintenance costs
    - ii. special tariffs or life line tariffs for low levels of use or consumption of services or for basic levels of service; or
    - iii. any other direct or indirect method of subsidisation of tariffs for poor households;
  - (d) tariffs *must reflect the costs* reasonably associated with rendering the service, including capital, operating, maintenance, administration and replacement costs, and interest charges;
  - (e) tariffs must be set at levels that *facilitate the financial sustainability* of the service, taking into account subsidisation from sources other than the service concerned;
  - (f) provision may be made in appropriate circumstances for a *surcharge* on the tariff for a service;
  - (g) provision may be made for the *promotion of local economic development* through special tariffs for categories of commercial and industrial users;
  - (h) the *economical, efficient and effective use of resources*, the recycling of waste, and other appropriate environmental objectives must be encouraged; and
  - (i) the extent of *subsidisation* of tariffs for poor households and other categories of users should be *fully disclosed*.
- (3) A tariff policy may differentiate between different categories of users, debtors, service providers, services, service standards, geographical areas and other matters as long as the differentiation does not amount to unfair discrimination.

The methodology outlined in this guide will ensure that a municipality sets tariffs that are in compliance with the requirements of the Municipal Systems Act.

### 1.3 Other important regulations and guidelines

Municipalities should also be aware of the following:

The Department of Water and Sanitation (DWS) regulates water tariffs and has norms and standards that apply for water services in place (DWS, 2015).

The National Energy Regulator of South Africa (NERSA) regulates electricity tariffs. Its Cost of Supply Framework (NERSA, undated) is an important reference for municipalities. NERSA publishes annual tariff guidelines with which municipalities must comply.

Finally, the Department of Environmental Affairs (DEA) is responsible for solid waste tariffs. DEA has introduced a Municipal Solid Waste Tariff Strategy (DEA, 2012a) and a set of guidelines for local authorities (DEA, 2012b).

## 2 Approach to tariff setting

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The tariff setting approach proposed in this methodology has four fundamental foundations:

1. The starting point of the tariff setting process must be a credible budget;
2. Tariffs should be set at a level that ensures that the municipal budget is fully funded;
3. Tariffs should be cost reflective, or the full cost of providing services should at least be the starting point in setting tariffs; and
4. The application of subsidies should be transparent.

### 2.1 Starting with a credible budget

The starting point for sound tariff setting is a credible budget. A credible budget is one that ensures the funding of all approved items and is anchored in sound, timely and reliable information on expenditure and service delivery (FFC, 2011).

Credible budgets are critical for local government to fulfil its mandate to sustainably provide services. **If the budget is not credible then tariffs will not result in financial sustainability even if they are set using a sound methodology.**

A credible expenditure budget reflects the costs necessary to provide a service efficiently and effectively.

- An *effective* budget is one that is adequate to deliver a service of the necessary quality on a sustainable basis.
- An *efficient* budget is one that delivers services at the lowest possible cost.

In many cases, municipal budgets have costs that are bloated in some areas (high governance and administration costs are one commonly cited example of this) but inadequate in other areas (inadequate allowance for maintenance is a commonly cited example of this). This means that a budget may be both ineffective and inefficient.

Before starting with the tariff setting process, a municipality should assess its budget to determine its efficiency and effectiveness.



Ideally, a budget should be zero-based, at least periodically. This would typically require an assessment of what infrastructure is in place and what is needed to operate and maintain this infrastructure. Zero-based budgeting is not covered in this methodology. Rather, this methodology takes the expenditure budget as the starting point and assumes that the budget is credible.

## 2.2 Ensuring a fully funded budget

The Municipal Budget Reporting Reform Schedule A budget formats required by National Treasury include a Standard Classification for municipal expenditure. The functions performed by a municipality under this Standard Classification can be broadly grouped into three groups as shown in the table below.

Table 1: Functional classification applied in the tariff model

| Standard Classification grouping    | Standard Classification       | Proposed grouping for trading services tariff analysis |
|-------------------------------------|-------------------------------|--------------------------------------------------------|
| Governance and Administration       | Executive and Council         | Governance and Administration                          |
|                                     | Budget and Treasury office    |                                                        |
|                                     | Corporate services            |                                                        |
| Trading Services                    | Electricity                   | Trading Services                                       |
|                                     | Water                         |                                                        |
|                                     | Wastewater management         |                                                        |
|                                     | Waste management              |                                                        |
| Community and Public Safety         | Community and Social Services | Other services                                         |
|                                     | Sport and Recreation          |                                                        |
|                                     | Public Safety                 |                                                        |
|                                     | Housing                       |                                                        |
|                                     | Health                        |                                                        |
| Economic and Environmental Services | Planning and Development      |                                                        |
|                                     | Road transport                |                                                        |
|                                     | Environmental protection      |                                                        |

There are two services groupings in the table above, namely trading services and other services.

*Trading services* are funded largely by tariffs, supplemented by operating grants and subsidies. Setting the tariffs for these services is the focus of this methodology. The trading services may



include some portions that are publicly accessed and so funded by property rates (notably public space cleansing under Solid Waste Management and public lighting under Electricity).

*Other services* in the table above are what is commonly called 'rates and general' services, which means that they are largely funded by property rates and other general sources available to the municipality, again supplemented by operating grants and subsidies.

*Governance and administration* are not services provided directly to municipal customers. They are internal functions necessary to ensure that the municipal organisation operates effectively. There are no separate funding sources for these functions. They must be funded through tariffs, property rates and other non-tariff revenue.

According to the Municipal Financial Management Act Number 56 of 2003 (MFMA) Section 18(1) a budget may only be funded out of:

- Realistically anticipated revenues to be collected;
- Cash backed accumulated funds from the previous years' surpluses not committed for other purposes; or
- Borrowed funds, but only on the capital account.

In other words, a fully funded budget is one in which realistically collectible property rates, tariffs, operating grants and subsidies and other non-tariff revenue sources are sufficient to cover the operating expenditures incurred in providing the trading services and other services, *and to cover the governance and administration costs.*

A fully funded budget should also *allow for some surplus on the operating account* so that the municipality can build up cash backed accumulated funds to finance capital expenditure.

It is very common in South African municipalities that property rates raised are insufficient to cover municipal expenditure on publicly accessed services. In this case, tariffs must be set at a level that covers the costs of the trading services and also covers any deficit incurred on the other services. The revenue required from all tariffs must thus equal the total expenditure of the municipality less non-tariff revenue sources, with allowance for a surplus. The diagram below illustrates the revenue required to ensure a fully funded budget.

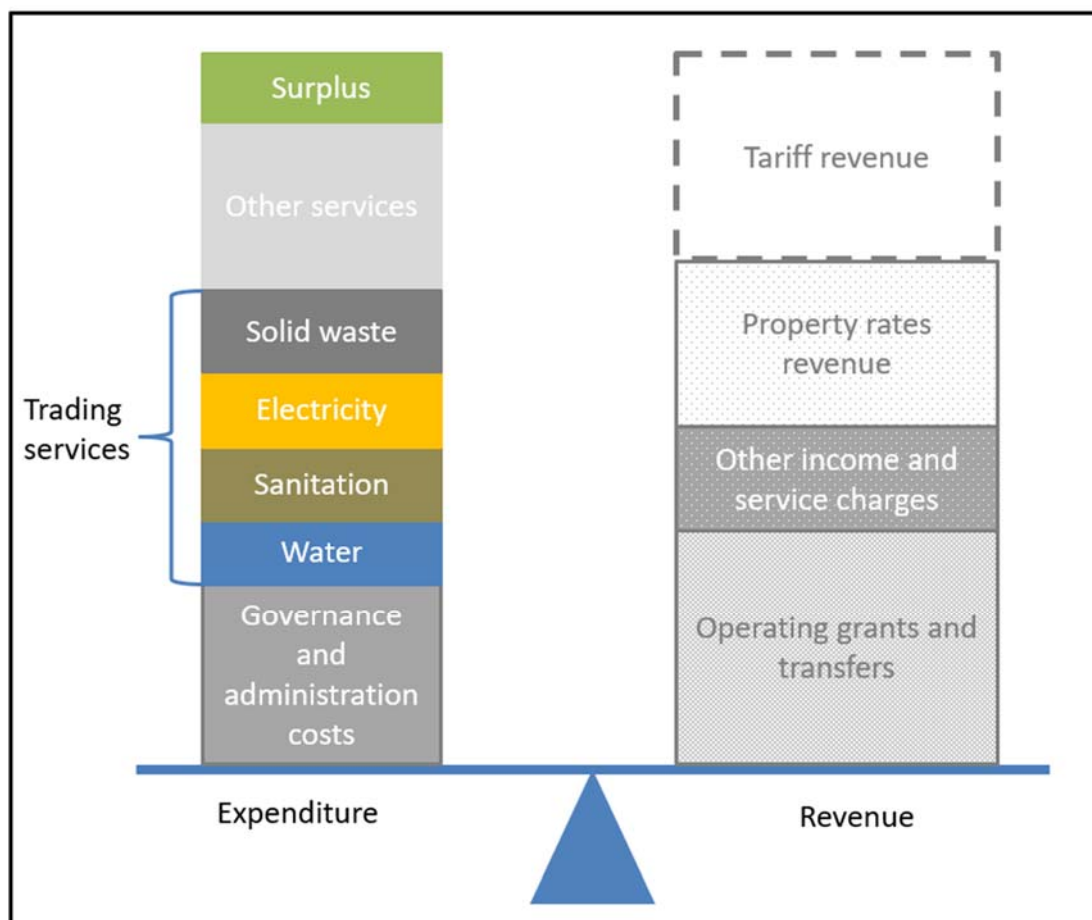


Figure 1: Diagrammatic representation of calculation of tariff revenue required to ensure a fully funded budget

Note that setting property rates is outside the scope of this methodology. However, the level of the property rate has a significant impact on the level of tariffs. If property rates are insufficient to cover the costs of other services, then tariffs must be set at a higher level to make up the deficit.

## 2.3 Setting cost reflective tariffs

### *What are cost-reflective tariffs?*

According to a strict definition, a cost-reflective tariff is one that reflects the true cost of providing a service with no reliance on subsidies. In South Africa, some reliance on subsidies is accepted. Municipalities may also use non-tariff revenue sources such as property rates and other incomes to fund a service. Finally, municipalities in South Africa also typically cross-subsidise between services. They generate surpluses on some services but deficits on others. This is also understood to be allowed when setting cost-reflective tariffs, as long as the levels of cross-subsidy are made clear and as long as the budget generates an operating surplus overall (in other words, surpluses generated on some services are more than sufficient to cover deficits generated on others).

For the purposes of this methodology, a **cost-reflective tariff thus means a tariff that will generate enough revenue to result in a fully funded budget, once subsidies, property rates, other income sources, surpluses and deficits are accounted for.**

This means that *a cost-reflective tariff may differ from the unit cost of providing a service*. The cost-reflective tariff may be higher than the unit cost if a surplus is being generated on a service. It may be lower than the unit cost if a deficit is being generated on a service, if subsidy has been allocated to a service, or if non-tariff revenue sources (property rates and other income sources) have been allocated to the service.

#### *What costs should be included?*

A cost-reflective tariff should include all costs required to run a service sustainably into the future.

This includes the *day-to-day operations and maintenance costs* of the service (employee related costs, bulk purchases, other materials, contracted services and other expenditures) as well as *capital financing costs*. Capital financing costs are any costs required to manage existing capital assets and to expand capital assets in future. This would include depreciation and impairment of assets used to provide a service; and finance charges on any loans historically raised to finance assets used to provide the service. This would also include a surplus to be generated on the service in order to build up cash backed accumulated funds to finance capital expenditure in future.

It is very important that finance charges are adequately allowed for in tariffs. Depreciation accounting, for example, is intended to ensure that municipalities generate cash surpluses through their tariffs that can be set aside to replace assets when they reach the end of their useful lives. If depreciation is not adequately accounted for when setting tariffs, municipalities will not be able to replace assets and will not be sustainable over the long run.

*Debt impairment* must also be accounted for when setting a cost-reflective tariffs. Again, this is to ensure that the tariffs will result in a funded budget. Debt impairment is included on the operating account to account for the fact that not all the revenues anticipated are realistically collectible. If debt impairment is not included as a cost item when setting cost-reflective tariffs, then the revenues collected will not be enough to cover planned expenditures. Again, this will have significant implications for the financial sustainability of the municipality.

In this methodology, the day-to-day operations and maintenance costs, capital financing costs and provisions for bad debt are referred to collectively as the **direct costs** of providing a service.

A cost-reflective tariff must also reflect a share of the *governance and administration costs* incurred in running the municipality as a whole. These costs include corporate services such as IT and human resources, budget and treasury, executive and council and other administrative services. These functions are all crucial to the operation of the municipality but do not generate any revenue. Governance and administration costs must be allocated between services departments and accounted for when setting cost-reflective tariffs. These costs are often referred to as **indirect costs**.

In sum, the costs considered when setting a cost-reflective tariff must include day-to-day operations and maintenance costs, capital financing costs and provisions for bad debt, which are collectively referred to as direct costs. They must also include a portion of the governance and administration costs of the municipality, referred to as indirect costs.

## **2.4 Improving transparency with regard to subsidisation**

There are, broadly, two kinds of subsidies applied by municipalities. Firstly, external operating grants and transfers are used to subsidise the provision of certain services and customer groups. This means that the tariffs charged on these services or to these customer groups will be lower than the cost of providing them with the service.

Secondly, cross-subsidisation is used. This is an internal mechanism where a surplus generated on one service or customer group is used to subsidise another service or customer group. This means that the tariffs charged on some services or customer categories are below the cost of providing them with the service, while the tariffs charged to others are above cost.

As discussed in Section 2.3 above, if the true cost of providing the service has been used as the starting point in the tariff setting process, the tariffs can still be said to be ‘cost-reflective’ if subsidies are accommodated. However, the Municipal Systems Act clause 74(1)(h) requires that the level of subsidisation be fully disclosed. The level of transparency with regard to subsidies, cross-subsidies in particular, is generally very poor at present. Cost-reflective tariffs should be transparent about how subsidies have been applied and which tariffs are above or below cost as a result. This requires a municipality to clearly indicate:

- How external grants and subsidies have been allocated between services and customer categories;
- Which services and customers pay tariffs that are above cost and the size of surpluses generated as a result; and
- Which services and customers pay tariffs that are below cost and the size of deficits generated as a result.

## **3 Steps to setting cost-reflective tariffs**

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The methodology and accompanying tool outline a simple process for calculating municipal tariffs, which comprises the following key steps:

1. Determine a basic cost of supply for each service as a whole
2. Determine the revenue requirement for each service as whole
3. Assess the customer mix and allow for growth in number of customers and volumes sold
4. Determine the average unit cost per customer category
5. Determine the revenue requirement per customer category
6. Select a tariff structures and calculate the tariffs
7. Test the affordability of the tariffs

These steps are outlined in detail in the sections that follow.

### **3.1 Determine the cost of supply for each service as a whole**

In this methodology, determining the cost of supply is a simple process of allocating direct and indirect costs in a credible expenditure budget to different services. Refer back to Section 2.1 for a discussion of credible budgets. The methodology assumes that the expenditure budget

used to determine the cost of supply is credible and that expenditures are sufficient to allow the municipality to deliver a service efficiently and effectively.

### 3.1.1 Align votes and trading service functions

Municipal budgets are typically prepared according to votes, which are then brought together to form a full municipal budget. MFMA Circular 12 defines a vote as a main segment into which the municipal budget is divided for the appropriation of money to the different functional areas of the municipality (National Treasury, 2005).

The National Treasury Municipal Budget Reporting Reforms standard budgets require municipalities to report on the General Functional Classification (GFC), which means that it must be possible to align the votes with the defined GFC functions.

A municipality can use its budget votes as the basic structure for analysis in this methodology, but it is important that the *costs of providing each of the four trading services, namely water, sanitation, electricity and solid waste can be analysed separately*. This means that if, for example, a municipality has a single vote for water and sanitation, these must be separated into two sub-votes. As another example, some municipalities have a single vote for 'civil engineering services' that covers water, sanitation, roads and stormwater and so on. This vote would have to be broken down into sub-votes that reflect each of the trading services separately.

The goal is to have a vote or sub-vote for each trading service that reflects the costs associated with providing that service. There will also be several other votes or sub-votes that reflect the governance and administration, community and social services, and economic and environmental services functions of the municipality.

### 3.1.2 Allocate direct costs between services

As a first step to determining the basic cost of supply for each service as a whole, a municipality will need to allocate direct costs between services in order to calculate the total direct cost of providing each service. Recall from Section 2.3 of the methodology, that direct costs include the day-to-day operations and maintenance costs associated with providing the service, the capital financing costs, and the debt impairment cost.

Since budgeting takes place by vote, most direct costs are allocated between votes during the budgeting process. There are, however, some direct costs that are often allocated against the finance vote but that must be allocated between services. These are debt impairment, depreciation and finance charges. As already discussed in Section 2.3 of this methodology, these costs are important elements of the cost of supply for a service. Suggestions on how to allocate these costs are provided below.

#### *Depreciation and asset impairment*

Depreciation reflects the extent to which assets are 'used up' over time. Sound depreciation accounting should result in a municipality generating cash surpluses that can be set aside in cash backed reserves to fund future capital replacement. Depreciation and asset impairment is thus an important element of the cost of supply for a service. A cost reflective tariff must include the cost of depreciating and impairing the assets used to provide the service and these costs must thus be allocated between services, not simply accounted for against the budget and finance department.

Depreciation and asset impairment should be allocated between services by *allocating the assets in the asset register to each service*. The depreciation on all assets allocated to each service can then be added up to determine the total depreciation of assets for that service.

### *Finance charges*

Finance charges largely comprise interest on long term loans. This is thus also an element of the cost of supplying a service: it reflects the cost of financing the capital expenditure necessary to provide the service sustainably.

In theory, municipalities are required to raise loans to fund specific assets. This would make the allocation of finance costs between services simple: the finance charge would be allocated to the vote for which the asset was purchased. However, in practice loans are often raised to finance capital expenditure broadly and not linked to particular assets. In this case, municipalities must use some rational basis to allocate finance charges between services. The *total capital expenditure less grants incurred on each service over the past three years* is one possible proxy for allocating finance charges between services.

### *Debt impairment*

If the municipality knows how much was collected on each service in the previous year, then a collection rate can be calculated per service and debt impairment in the budget year allocated based on this.

Some municipalities are not able to allocate cash collected to services. In this case, the amount *billed revenue per service in the previous financial year* can be used as a proxy to allocate debt impairment in the budget year.

### 3.1.3 Allocate indirect costs between services

There are several bases on which governance and administration costs can be allocated between services. The most sophisticated is known as *Activity Based Costing*. Under this allocation method, cost drivers are identified for each activity within a function. For example, recruiting is an activity performed by the Human Resources department. The number of interviews conducted might be identified as the cost driver for recruiting. The costs of the recruiting activity within Human Resources would then be allocated between the services department based on the number of interviews conducted by the Human Resources department on behalf of each of the services department in the previous year.

A simpler approach is to identify a *cost driver for a full function* as opposed to for each activity within a function. For example, the cost driver for the Finance and Budget function might be identified to be the size of the budget. The costs of the Finance and Budget directorate would then be allocated between the services departments based on the size of the budget of each service department.

Note that with the introduction of mSCOA municipalities are required to allocate the costs of support functions (overheads) to services functions under the Costing segment.

National Treasury's Costing Methodology for local government guidelines provides a detailed breakdown of the various approaches for allocating indirect costs (National Treasury, n.d. p. 13).

### 3.1.4 Calculate the total cost of each service

The total cost of supply for each trading service is the sum of the direct costs of supply and the allocated share of the indirect costs.

## 3.2 Determine the revenue requirement for the service

Once the total cost of supply for each trading service has been determined, the municipality must determine what revenue is required from tariffs for each service to ensure that the budget is fully funded. The revenue required and the cost will differ if the municipality allocates any non-tariff revenue to the service and/or if the municipality plans to generate a surplus or deficit from the service.

### 3.2.1 Allocate non-tariff revenue sources between services

Non-tariff revenue sources are grouped here into operating grants and transfers, property rates, other income and non-tariff service charges.

#### *Operating grants and transfers*

External operating grants and transfers from national and provincial government are used to subsidise the provision of certain services. This means that the tariffs charged on these services will be lower than the cost of supply.

The local government equitable share (LGES) is the largest operating transfer received by municipalities. The equitable share is unconditional, and municipalities have full discretion with respect to its allocation. The way in which this is allocated, however, directly affects tariffs: allocating more equitable share to a service will lower the tariffs that must be charged, while allocating less will raise the tariffs. The total amount of equitable share available to the municipality is fixed, and so the municipality must make strategic decisions about which services will be subsidised and by how much.

Because the equitable share is unconditional, municipalities may allocate it in any way in which they choose. It is important that the municipality is transparent about the way in which the equitable share has been allocated.

#### *Property rates*

Property rates are typically used to pay for services that are publicly accessed. Most property rates revenue is thus allocated to the 'other' (non-trading) services. A municipality may choose to allocate property rates to a trading service, however, if a portion of that trading service is publicly accessed. For example, this may be the case for the street lighting component of electricity.

#### *Other income sources*

Other income sources include other service charges, rental of facilities and equipment, interest earned on external investments, interest earned on outstanding debtors, dividends received, fines, licences and permits, income from agency services *et cetera*. These revenue sources should be allocated between the services.

Note that many of these revenues are typically allocated to the 'governance and administration' functions. If this is the case, they should be allocated between the services in the same proportion used to allocate the governance and administration expenditures as discussed in Section 3.1.3 above.



### *Non-tariff service charges*

There are a number of other service charges identified in mSCOA v 6.3 that are not defined as ‘tariffs’ under this methodology. These charges include, among others, connection and disconnection charges, meter reading charges, availability charges, and waste disposal charges. The revenues generated from these charges should be allocated to the services. They will reduce the revenue required from the tariffs.

For solid waste, the methodology applies only to solid waste removal tariffs. If the municipality is levying charges for any other solid waste services (disposal, recycling or other treatment) then the revenue to be generated from these charges must be estimated for the budget year and treated as a ‘non-tariff service charge’.

For sanitation, charges for treating industrial effluent would also fall need to be accounted for here.

#### 3.2.2 Allow for a deficit

A municipal council may choose to allow for a deficit to be incurred on some services, subject to the recommendations of the Chief Financial Officer. Deficits may be approved to the extent that they are necessary to ensure that tariffs are affordable. **Deficits on a service may only be accommodated if they do not result in an overall budget that is unfunded.** Deficits must thus be subsidised out of external subsidies or through cross-subsidisation from other services in order to ensure that the overall budget is funded.

#### 3.2.3 Allow for a surplus

The Municipal Fiscal Powers and Functions Act Number 12 of 2007 allows municipalities to levy a surcharge on tariffs in appropriate circumstances. This is a “*charge in excess of the municipal base tariff that the municipality may impose on fees for a service provided by or on behalf of the municipality*”. Consequently, the municipality would generate a surplus on its budget. An example of appropriate reasons to generate a surplus is for transfers to a reserve to fund future capital expenditure or to cross-subsidise the cost of providing another service.

The level of the surcharge is a strategic decision and should adhere to two principles:

1. The benefit principle which requires that payments be related to benefits; and
2. The ability to pay principle which requires that beneficiaries pay in accordance to their income generating capacity to ensure equity.

The surcharge can be levied on some or all services. Once decided, the surplus generated from the surcharge should be added to the total cost to get the total cost of supply plus surplus per service.

**For water and sanitation, the DWS Norms and Standards recommend a net surplus of a minimum of 6% per annum on revenue (DWS, 2015: 92). For electricity, the NERSA tariff guidelines and benchmarks recommend a surplus of 15% (NERSA, 2019: 15).**

#### 3.2.4 Calculate the revenue required from tariffs for each trading service as a whole

The revenue required from tariffs for a specific service is the cost of supplying that service less any deficit to be allowed, plus any surplus to be generated, and less non-tariff revenue allocated to the service.

Following this process to determine the revenue required from tariffs will ensure that the budget is fully funded.

### **3.3 Assess the customer mix and allow for growth**

A sound understanding of customers is a key element of tariff setting. Tariffs might be levied based on number of customers, their demand for services and/or the volumes that they purchase.

#### **3.3.1 Select customer categories**

Most municipalities do not offer a single a single tariff to all customers. Typically, different tariffs are offered to different customer categories. National legislation and guidelines recommend that there must be at least three customer categories, namely, domestic, commercial and industrial. It is recommended that additional customer categories be defined only if:

1. The cost of providing the service to that customer category is different from providing it to another customer category; or
2. That customer category is going to be subsidised in a different manner to another customer category.

The cost of providing a service to a customer category is likely to be different if the customer category receives a different *level of service*. For example, the costs of providing customers with septic tanks is different to that of providing full waterborne sanitation.

It may be useful for a municipality to define at least two domestic customer categories, one that is indigent and one that is non-indigent if it wishes to subsidise indigent domestic customers but not non-indigent domestic customers.

Customer categories should include those who are not tarified (for example, customers who receive water through communal standpipes) as it is important to understand what it costs to provide services to these customer categories and be clear on how this expenditure will be funded.

Limiting the number of customer categories will help to keep tariffs simple and make them more transparent.

#### **3.3.2 Gather data on customers**

There are three types of data that may be important in setting tariffs for customers. These are data on the volumes of service sold to each customer category, the demand for services by each customer category, and the total number of customers in each category.

##### *Volumes of service 'sold'*

Tariffs are often levied based on the volumes of service sold to a customer category. Municipalities would therefore need to have data on the total volume of a service sold to different customer categories.

If a service is provided free of charge, it is important to know both the volume of services provided free and the volume of billed services per customer category. This is particularly relevant for South Africa, where legislation requires a certain volume of some services, particularly water and electricity, to be provided free of charge.

For water and electricity, municipalities would need data on the total volume of water sales in kls and the total volume of energy sales in kWhs for different customer categories.

#### *Volumes of service 'sold' for sanitation*

For sanitation, it is not possible to measure the volume of wastewater returned by an individual customer. Municipalities can estimate this by starting with the volume of water sold to the customer and applying a return flow. A return flow is an assumption about what percentage of the volume of water sold to the customer is returned to the sewerage system. It is fairly simple to calculate the overall return flow of a municipal system. This would be the total volume of wastewater treated divided by the total volume of water sold. The municipality could apply this return flow to the volume of water sold to each customer in order to estimate the volume of wastewater returned by that customer. An average return flow for a municipality as a whole is often around 70%.

A more sophisticated approach would be to use different return flows for different customer types; and/or to use different return flows at different levels of consumption for domestic customers.

*Different return flows for different customer types* reflect the fact that some customers return a larger volume of the water that they buy than others. Commercial customers, for example, tend to return a large proportion of the water that they purchase because much of their water use is for toilet flushing. Industrial customers who use water in their industrial processes may return a very small proportion of the water that they use. One large metropolitan municipality, for example, uses the return flows for non-domestic customers shown in Table 2 below.

**Table 2: Example of different return flows assumed for different customer categories**

| Customer category             | Wastewater discharge assumed as % of volume of water sold |
|-------------------------------|-----------------------------------------------------------|
| Industrial customer           | 65%                                                       |
| Commercial customer           | 80%                                                       |
| Sports facilities             | 45%                                                       |
| Parks or public open spaces   | 2%                                                        |
| Other institutional customers | 80%                                                       |

Note that if a municipality is choosing to use different return flows for different customer categories, it must be certain that the total return flows balance with the total volume of water returned in the municipality as a whole.

*Different return flows at different levels of water consumption for domestic customers* again more closely matches reality than a single return flow across all consumption levels. The first few kl of water sold to a domestic customer are typically used for drinking, cooking, personal washing and cleaning. A large proportion of the water used for these purposes will be returned down the drain. At lower volumes of water consumption, toilet flushing also makes up a large proportion of water usage. Households who use large volumes of water, however, are often using water for washing cars, watering gardens or filling swimming pools. This water is not

returned down the drain. Reducing the assumed return flow as the volume of water purchased increases is a way to accommodate this. The example below is taken from a large metropolitan municipality in South Africa.

**Table 3: Example of different return flows assumed at different levels of water sold for domestic customers**

| Volume of water sold in kl per month | Wastewater discharge assumed as % of volume of water sold |
|--------------------------------------|-----------------------------------------------------------|
| 0 to 6kl                             | 98%                                                       |
| 7 to 12kl                            | 90%                                                       |
| 13 to 18kl                           | 75%                                                       |
| 19 to 24kl                           | 60%                                                       |
| 25 to 30kl                           | 50%                                                       |
| 31 to 42 kl                          | 10%                                                       |
| More than 42kl                       | 1%                                                        |

The return flows are applied in blocks, so the assumed volume of wastewater returned by a customer who uses 12kl of water would be:

$$6 \text{ kl} \times 98\% + (12-6) \text{ kl} \times 90\% = 6 \text{ kl} \times 98\% + 6 \text{ kl} \times 90\% = 5.88 \text{ kl} + 5.40 \text{ kl} = 11.28 \text{ kl}$$

As for the use of different return flows for different categories of customer, the municipality must take care to set the return flows at different water consumption blocks in such a way that the total calculated return flow matches the actual total return flow in the municipality.

#### *Volumes of service 'sold' for solid waste*

For solid waste, volume of service sold refers to mass of waste collected. Municipalities in South Africa do not currently have the technology available to determine this and typically thus do not determine the volume of service sold for solid waste. This means that municipalities cannot levy consumption-based tariffs for solid waste.

#### *Demand for services*

Many of the costs associated with providing a service are largely fixed and do not vary with the volume of a service sold. This is particularly true of the costs associated with maintaining infrastructure. The extent of infrastructure required to provide a service is related to the peak demand for that service: sufficient infrastructure must be in place to supply the peak demand, even though demand may be lower than the peak for most of the time.

It is thus useful, if possible, to understand what the peak demand for a service is for each a customer category. The NERSA Cost of Supply Framework (NERSA, undated) requires that municipalities allocate some costs based on demand when determining the cost of supply for electricity. Unfortunately, many municipalities currently are not able to determine the peak demand for a service by customer category.

### *Number of customers*

There are two important reasons for knowing the number of customers in each customer category.

Firstly, the municipality may wish to levy a fixed charge based on number of customers.

Secondly, some of the costs incurred in providing a service will increase or decrease as customer numbers increase or decrease. Good examples here are the costs of billing, accounting, and other costs associated with customer connections. Knowing the number of customers in each category allows a municipality to allocate these costs between the customer categories.

#### **3.3.3 Allow for growth**

Tariffs are set for a financial budget year but data on volumes sold, demand and number of customers will be actual data based on a current or previous financial year. Therefore, the sales volumes, number of customers, and demand for services data will need to be adjusted upwards to reflect anticipated sales volumes, customer numbers and demand for the year for which the budget is being prepared.

One way to do this is to assess historic trends in sales volumes, customer numbers and demand in order to determine an average unit growth. This unit growth can then be applied to project sales volumes, customer numbers and demand forward to the year in which the tariffs are to be set.

Another option is to consider the capital programme in place and determine how many additional customers will be connected to the service.

Municipalities may choose to allow for growth as they see fit. The key point is that sales volumes customer numbers and demand should be adjusted upward to allow for growth when setting tariffs.

### **3.4 Determine the average unit cost per customer category**

Once the total cost of each service has been calculated and the customer mix has been assessed, the average unit cost per customer category can be determined. This requires allocating costs between customer categories.

#### **3.4.1 Allocating costs between customer categories**

Costs should be classified as fixed or variable and then allocated between customers accordingly.

##### *Fixed and variable costs*

A *variable* cost is a cost that is associated with the amount of service sold. A variable cost increases and decreases with the volume sold. When sales volume goes up, the variable costs will increase. On the other hand, if the sales volume goes down, so too will the variable costs.

A *fixed* cost does not vary with the volume of production. It remains the same even as sales volumes rise and fall.

For municipal trading services, fixed costs are often associated with the infrastructure required to provide a service. Infrastructure must be sized to provide for the peak demand for

a service. When sales drop below peak level, the infrastructure is still in place and must be operated and maintained.

Municipalities usually classify most of their costs as fixed. The most common costs that municipalities classify as variable are bulk purchases, electricity used in water or wastewater treatment, and chemicals used in water or wastewater treatment.

Note that *it is possible to classify a cost as a mix of fixed and variable*. Electricity bulk purchases are an example where this might be applied. The tariffs that Eskom uses to charge municipalities for electricity are complex and include a mix of charges that vary with the kWh of electricity that the municipality purchases and charges that are based on kVA demand or other fixed factors. The charges that vary with kWh purchased from Eskom include active energy charges, ancillary service charges and electrification and rural subsidy charges. Charges that do not vary with kWh purchased from Eskom include distribution network charges, service charges, administration charges and reactive energy charges. A municipality may wish to analyse the bills that it receives from Eskom and classify the distribution network charges, service charges, administration charges and reactive energy charges as fixed costs and the active energy charges, ancillary service charges and electrification and rural subsidy charges as variable costs. Based on this analysis, it would classify a proportion of its bulk purchases as fixed and a proportion as variable.

As noted in Section 3.3.2, municipalities in South Africa do not currently have the technology available to determine the mass or volume of waste collected from different customer categories. It is thus suggested that all *solid waste costs* be classified as fixed.

#### *Customer-based fixed costs and demand-based fixed costs*

The NERSA Cost of Supply Framework (NERSA, undated) requires that municipalities allocate some fixed costs based on demand when determining the cost of supply for electricity, and some based on number of customers.

*Customer-based fixed costs* are those that vary based on the numbers of customers served. For electricity, this is typically costs associated with metering or billing. This is usually a relatively small portion of total fixed costs.

*Demand-based fixed costs* are those that vary with the peak kVA demand by customers. Most of the costs associated with operating and maintaining infrastructure would be classified as demand-based fixed costs. This is typically most fixed costs.

If a municipality does not know what proportion of its fixed electricity costs is customer-based costs and what proportion is demand-based costs, it is recommended that it considers all fixed costs to be demand-based.

#### *Basis for allocating variable costs*

Variable costs should be allocated between customer categories based on the volume of a service sold to that category.

For water and electricity, this would be based on the kl or kWh sold respectively. For sanitation, variable costs can be allocated between customer categories based on the estimated volume of wastewater returned by each category. For solid waste, it has been proposed that all costs should be classified as fixed and there will be no allocation of variable costs between customer categories.

### *Basis for allocating fixed costs*

If a municipality has classified its costs as customer-based fixed costs and demand-based fixed costs then it should allocate the customer-based fixed costs between customer categories based on the number of customers in each category; and the demand-based fixed costs between customer categories based on the peak demand by each category.

As already noted, many municipalities do not have data on the peak demand for services by different customer categories. In this case, the municipality has three possible bases for allocating demand-based fixed costs:

1. Number of customers: this is the least preferred of the options as number of customers is not a strong proxy for demand;
2. Volumes sold: this has some rational basis as peak demand is generally related to volume sold although the peak factor for different customer categories will vary; or
3. Estimated demand based on applying a peak factor to the average volume sold to that category: a peak factor is the ratio of maximum demand to average demand; peak factors can be estimated based on literature and an understanding of the profile of customers in the municipality.

Of the three options, option 2 is the simplest and is favoured over option 1.

### *Summary of proposed approach for allocating costs to customer categories*

Table 4: Proposed approach to allocating costs between customer categories

| Service     | Allocation of variable costs                                                                                   | Allocation of fixed costs                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-------------|----------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Water       | Based on volume of water sold to each customer category                                                        | Based on volume of water sold to each customer category                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Sanitation  | Based on estimated volume of wastewater returned by customer category, calculated using estimated return flows | Based on estimated volume of wastewater returned by each customer category                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Electricity | Based on volume of electricity sold to each customer category                                                  | <p>Separate into customer-based fixed costs and demand-based fixed costs.</p> <p>If there is no data on distribution between customer-based and demand-based, assume all fixed costs to be demand-based.</p> <p>Allocate customer-based fixed costs based on number of customers in each customer category.</p> <p>Allocate demand-based fixed costs based on peak demand by each customer category. If data on peak demand is not available, allocate based on volume of electricity sold to each customer category or using an estimate of peak</p> |



|             |                                                                                                                              |                                                                                |
|-------------|------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|
|             |                                                                                                                              | demand arrived at by applying a peak factor to the volume of electricity sold. |
| Solid waste | Not applicable. Municipalities are not currently able to determine the mass or volume of waste collected from each customer. | Based on number of customers in each category.                                 |

### 3.4.2 Calculating the average unit cost per customer category

Unit costs are calculated in order to provide a basis for comparing tariffs levied to unit costs. This makes any subsidisation transparent (recall that a cost-reflective tariff may be higher than the unit cost if a surplus is being generated on a service; and it may be lower than the unit cost if a deficit is being generated on a service, if subsidy has been allocated to a service, or if non-tariff revenue sources have been allocated to the service).

The average fixed cost of a single unit per customer category is calculated by dividing the total fixed cost per customer category by the total number of customers in each category for each trading service. If a demand cost has been determined, an average customer cost per customer can be calculated as well as an average demand cost per unit demand.

Average variable costs per customer category are calculated by dividing total variable costs per category by total volumes sold to each category.

## 3.5 Determine the revenue requirement per customer category

The revenue requirement per customer category is calculated by allocating non-tariff revenue sources, deficits and surpluses between customer categories to determine the revenue required per customer category.

### 3.5.1 Allocating non-tariff revenue sources per customer category

Municipalities need to allocate non-tariff revenue sources between customer categories defined for that service. Recall that non-tariff revenue sources include operating grants and subsidies, property rates, other income sources, and non-tariff service charges.

*Operating grants and subsidies* are typically allocated to any customer category that has been defined as indigent or lifeline. This will reduce the revenue required from that customer category and thus lower the tariff. If the municipality does not have a separate customer category for indigent or lifeline customers, then operating grants and subsidies would be typically be allocated to domestic customer categories.

Typically, any *other non-tariff revenue sources* (property rates, other income sources and non-tariff service charges) allocated to a service are simply allocated between customer categories in proportion to the costs allocated to each category.

### 3.5.2 Allocating deficits and surpluses

If a municipality has chosen to allow a deficit or require a surplus on a service, then it must also decide on which customers the deficit will be allowed, or on which customers the surplus will be generated.

Surpluses will typically be generated on non-indigent domestic customers and/or on non-domestic customer categories.

### 3.5.3 Determining the revenue required per customer category

The revenue required for a specific service per customer category is the cost of supplying the service to that customer category, less non-tariff revenue allocated to the customer category, less any deficit allowed allocated per customer category, plus any surplus generated per customer category.

## 3.6 Select a tariff structure and calculate the tariffs per customer group

The tariff structure is the set of rules that determine how to calculate how much to charge each customer. There are a large number of tariff structures available and a municipality must choose the most appropriate for its goals and circumstances.

The municipality must then calculate what level of tariff to levy for each component of the tariff structure and for each customer group. The level of tariffs must be set to generate the required revenue but with consideration for the affordability to the customer.

### 3.6.1 Select a tariff structure

Tariff structures tend to fall on a spectrum from simple (with the simplest being a fixed charge per customer) to complex (multi-part time-of-use tariffs, for example). More complex tariffs often reflect the cost structure of a service more accurately and so may be more efficient at recovering revenue. However, setting complex tariffs accurately requires good data and they can be hard for customers to understand. It is recommended that municipalities apply the simplest possible tariff structure that will achieve its goals.

A few common tariff structures are discussed below.

#### *Fixed charges*

Fixed charges are unrelated to the amount of service sold to the customer. Fixed charges may be levied on various bases, for example per customer or per fixture (number of toilets, number of bins collected, for example).

Fixed charges are the simplest tariff structure. They are an excellent mechanism for recovering the fixed costs of providing a service (customer or demand costs) but not very effective at recovering variable costs.

Fixed charges may be regressive, because a fixed charge of, say, R100 a month is a small proportion of the income of a high-income household, but a large proportion of the income of a lower income household. One way to manage this concern is to levy a fixed charge that has blocks to it, with the tariff charged differing per block and blocks defined based on property size or property value.

In the current environment, with sales of water and electricity declining, including a fixed charge in a tariff structure to cover at least a portion of the fixed costs of providing the service is increasingly regarded as best practice. Ideally, the fixed charge should cover 100% of the fixed costs. However, this may result in a fixed charge that is unaffordable to poor households. A municipality may thus need to reduce the fixed charge in order to manage the potential regressive impacts on poor households. It is unfortunately not possible to provide guidance regarding what proportion of fixed costs should be covered through the fixed charge, as cost structures and affordability will differ from municipality to municipality. The recommendation here is thus that tariffs should include a fixed charge and that this fixed charge should cover

as large a proportion of fixed costs as is possible without compromising affordability. A municipality can consider phasing a fixed charge in over time in order to allow customers to adjust to the impact. If you are introducing a fixed charge for the first time, good communication with customers about the reason for introducing the fixed charge is very important to improve acceptance.

### *Consumption-based tariffs*

As the name suggests, consumption-based tariffs are levied per unit that the customer consumes (purchases, in fact). Consumption-based tariffs are considered equitable because a customer who uses more of a service will pay more for the service. Obviously, a consumption-based tariff can only be applied where it is possible to measure the volume of a service sold to a customer. This is possible for water and electricity where these are supplied on a metered basis (which is not the case for all levels of service: it is not possible to measure the volume of water provided to a household that receives water via a communal standpipe, for example).

For sanitation, consumption-based charges should be levied based on the volume of water sold with a return flow applied. See Section 3.3.2 for a discussion of return flows. Note that the DWS Norms and Standards require that municipalities levy a consumption-based tariff for sanitation. Under the Norms and Standards, municipalities may not charge for sanitation based on a fixed charge only.

For solid waste removal, the 'consumption' of a service would relate to the mass or volume of waste removed from each customer. As already discussed, municipalities in South Africa do not currently have the technology available to determine this. Consumption-based tariffs are thus not applied to solid waste removal currently.

### *Options for consumption-based tariffs*

There are various options for consumption-based tariffs with the most common being a uniform (or single) rate, or an Inclining Block Tariff (IBT). It is also possible to have declining block<sup>1</sup> tariffs but these are seldom applied in South Africa.

Under a uniform (or single) rate tariff, customers are charged the same price per unit regardless of what volume of a service they consume. This is simple to administer and easy for customers to understand. It does not, however, encourage resource efficiency as there is no rise in price as higher volumes are consumed. It also allows less opportunity for cross-subsidy between higher volume and lower volume users. Uniform (or single) rate tariffs are often applied for non-domestic customers in South Africa.

Under an IBT, tariffs are set in blocks with the price per unit rising with each block. This means that a customer who uses a high volume of water or electricity will pay more per unit on average than a customer who uses a small volume. See the example below.

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<sup>1</sup> This refers to a tariff where the price per unit decreases as the volume of service consumed increases. It reflects economies of scale and may be used to protect large volume water users but is seldom applied in South Africa because it does not encourage resource conservation and does not perform well from an equity perspective, as poorer customers tend to be low volume users.

**Table 5: Example demonstrating that an IBT results in an increasing price per kl as consumption increases**

|                                                                                        |
|----------------------------------------------------------------------------------------|
| Block 1: 0 to 6kl: no charge                                                           |
| Block 2: 6 to 12kl: R24.00 per kl                                                      |
| Block 3: 12 to 24kl: R26.00 per kl                                                     |
| Block 4: 24 to 36kl: R31.00 per kl                                                     |
| More than 36 kl: R33.00                                                                |
| Bill for 12kl = 6 kl x R0.00 + (12 – 6) kl x R24.00 = R144.00.                         |
| Price per kl = R144.00 / 12kl = R12.00 per kl                                          |
| Bill for 24kl = 6 kl x R0.00 + (12 – 6) kl x R24.00 + (24 – 12) kl x R26.00 = R456.00. |
| Price per kl = R456.00 / 24kl = R19.00 per kl                                          |

For domestic customers, the DWS Norms and Standards for Setting Water Services Tariffs (DWS, 2015) require municipalities to have an IBT tariff of three or more blocks for both water and sanitation while the NERSA municipal tariff guidelines (NERSA, 2019) recommend an IBT with between two and four blocks.

IBTs have two key advantages. Firstly, they provide a disincentive for wasteful consumption of water or electricity because the cost per unit rises with the volume consumed. Secondly, they provide an opportunity for cross-subsidisation between high volume and low volume users. This second point is expanded upon below.

Under an IBT, a domestic customer who uses a high volume of water, sanitation or electricity will pay more per unit on average than a domestic customer who uses a small volume. Tariffs can be set at or even below the cost of supply for the lower tariff blocks<sup>2</sup>; but above the cost of supply for the higher tariff blocks. It is important to note that this does not necessarily imply that high-*income* customers will be cross-subsidising low-*income* customers: there are many reasons why poor households may find it difficult to limit their consumption of services, with household size a key factor<sup>3</sup>. Thus, while IBTs are required by legislation for domestic water, sanitation and electricity tariffs in South Africa, municipalities should take care when setting the size of the tariff blocks. This should be done based on a sound understanding of patterns of consumption in the municipality and of the prevailing levels of consumption by poor households in particular.

The advantages and disadvantages of the various fixed and consumption charge options are summarised in the table below.

<sup>2</sup> Recall that one option suggested by the Municipal Systems Act for ensuring access to services by poor households is that tariffs are set to recover only operating and maintenance costs.

<sup>3</sup> Poor households in South Africa tend to be larger than wealthy households.

Table 6: Description of common tariff structures

| Type                      | Sub-type                                     | Description                                                                                                                                                                                                       | Advantages                                                                                                                                                                                                           | Disadvantages                                                                                                                                                                                                                                              |
|---------------------------|----------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Fixed charges             | Flat rate tariff                             | A periodic fixed charge for a service that is unrelated to the amount consumed.                                                                                                                                   | Simple and easy to administer. Preferable when metering costs outweigh benefits.                                                                                                                                     | Provides no incentive to restrict service use.                                                                                                                                                                                                             |
|                           | Fixture rate                                 | A periodic fixed charge for a service related to fixtures on the customers premises that give an indication of likely service use. (e.g. yard tank for water; number of toilets for commercial sanitation charge) | May reflect the cost of service better than a flat rate tariff, without actual metering. Only preferable when metering cost outweigh benefits.                                                                       | Requires accurate knowledge of fixtures and their relation to service use.<br><br>Provides no incentive to restrict service use.                                                                                                                           |
|                           | Tariff based on property size                | A periodic charge is levied based on the size of the plot served or the floor area of the building.                                                                                                               | May be useful where plot size indicates proxy to income of consumers or to cost of providing the service. In the case of building size, it may be used as a proxy for income of a commercial consumer.               | Each property has to be measured.<br><br>The relationship between income and property size may be poor.<br><br>There is generally a poor relationship between property size and service consumption.<br><br>Provides no incentive to restrict service use. |
|                           | Tariff based on property value               | A periodic charge is levied based on the value of the property served.                                                                                                                                            | Property value is generally regarded as a strong proxy for income.<br><br>No new dataset required. Municipalities have data on the value of properties already available for the purposes of levying property rates. | The relationship between property size and service consumption may not be strong.<br><br>Provides no incentive to restrict service use.                                                                                                                    |
|                           | Tariff based on number of users of facility. | The tariff is based on number of workers in a consumer's business, or hotel beds, for example.                                                                                                                    | May relate to the amount of a service consumed in commercial or institutional premises.                                                                                                                              | Often difficult to measure the number of users.<br>Provides no incentive to restrict service use.<br><br>Relationship between users and consumption may be weak.                                                                                           |
| Consumption-based tariffs | Single (uniform) rate                        | Consumers are charged the same price per unit of                                                                                                                                                                  | Simple and cheap to administer, especially                                                                                                                                                                           | Requires metering<br><br>Does not accurately reflect costs of service.                                                                                                                                                                                     |

|  |                 |                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|--|-----------------|--------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  |                 | consumption regardless of their level of consumption, with no fixed monthly charge                                                   | <p>where pre-payment meters are used.</p> <p>Easy for consumers to understand.</p> <p>The absence of volume discounts discourages excessive consumption.</p> <p>Considered equitable by large volume service users, such as industry.</p>                                                                                       | Has limited equity impact.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|  | Inclining block | Specific case of consumption-related tariff where the price per unit consumed increases as the amount of service consumed increases. | <p>Provides 'lifeline' tariff for consumers that use small quantities of the service.</p> <p>Price signals result in reduced average (and sometimes peak) service use, reflecting the cost of expanding system capacity to meet new demand.</p> <p>Introduces an 'automatic' cross subsidy from large users to small users.</p> | <p>Large volume users consider this tariff structure to be inequitable, as they provide disproportionately large amounts of revenue to the service provider.</p> <p>Prices in the initial blocks do not promote conservation of efficient service use as they do not reflect the cost of providing a service to individual consumers.</p> <p>Although inclining block tariffs contain an implicit cross-subsidy between low-volume poor consumers and higher-volume rich consumers, this subsidy is not often transparent.</p> |

Adapted from dplg (2000) *Guidelines for setting tariffs for municipal trading services*, draft 3

Some other more complex tariff structures are discussed below.

### *Multi-part tariffs*

Multi-part tariffs refer to a combination of other tariff types.

A two-part tariff, for example, is a fixed charge plus a consumption-based tariff. Two-part tariffs are encouraged for water, sanitation and electricity. They allow a municipality to recover all or some of their fixed costs through the fixed charge, and to recover their variable costs through the consumption-based charge. Recall from the discussion of fixed charges that it is desirable that the fixed charge portion of a two-part tariff be set in a way that reduces its regressive impact on poor domestic customers.

NERSA encourages the introduction of three-part tariffs for electricity, with a fixed charge per customer per month that recovers fixed costs that are related to the number of customers; a

fixed charge per kVA that recovers fixed costs that are related to peak demand; and a consumption-based charge per kWh sold. Introducing such a tariff requires that the municipality is able to determine the peak kVA demand for each customer. This is not possible for most municipalities at present for domestic customers. Three-part tariffs are in place for non-domestic electricity tariffs in some municipalities.

### *Time of use tariffs*

As the name suggests, time of use tariffs are tariffs where the amount charged to the customer differs with the time of day. They are most relevant for electricity. Eskom charges municipalities for bulk electricity based on the time of day, with a standard, peak and off-peak rate. Peak rates are almost 2.5 times higher than standard rates, while off-peak rates are about half standard rates. If municipalities charge their customers the same rate throughout the day, then they typically recover costs during the standard hours, make a surplus during off-peak hours, and make a loss during peak hours. A time of use tariff allows the municipality to more closely recover its costs through the tariff. However, time of use tariffs require more sophisticated meters that record the time of use that a customer buys electricity. Many municipalities do not have these in place; or have them in place for industrial customers only. There is no value in introducing time of use tariffs until the meters required to implement them are in place.

### *Seasonal tariffs*

Again as the name suggests, seasonal tariffs differ between winter and summer months. There are two primary reasons for introducing seasonal tariffs.

Firstly, if the usage pattern for a service differs significantly between the seasons, as it does for both water and electricity, a municipality may want to levy a higher tariff in the season during which usage is higher in order to discourage wasteful use.

Secondly, Eskom charges municipalities a seasonal tariff, with the average tariff in the high demand season almost double that in the low demand season. If a municipality charges a single tariff throughout the year, it will make money in the low demand season and lose money in the high demand season. It may want to charge a seasonal tariff to more closely match its costs.

A municipality should be aware of the affordability implications of introducing a seasonal tariff. Low-income households may have limited ability to reduce consumption in the high demand season and so may face unaffordable bills if the municipality introduces a higher tariff in this season.

### *Drought or scarcity tariffs*

Municipalities may want to introduce a higher tariff during times of scarcity in order to discourage wasteful use of a service. This is particularly relevant for water tariffs during times of drought.

If an IBT is in place, the drought tariff typically has no change to the lower tariff blocks but the higher tariff blocks are significantly increased in price. This continues to allow customers to use water for their basic needs but discourages higher levels of consumption.

Ideally, drought tariffs should be set with some understanding of the price elasticity of demand for the service. This refers to the percentage change in consumption that will result



from a percentage change in price. Understanding the price elasticity of demand will help the municipality to know how much they should increase the price of a tariff block in order to reduce consumption by the desired amount. Municipalities often do not have good data on the price elasticity of demand. It can be estimated by examining historic data on changes in demand when price increases were introduced.

### *Small Scale Embedded Generation (SSEG) tariffs*

SSEG systems refers to power generation facilities located at residential, commercial or industrial sites, where electricity is generally also consumed. These are mainly solar photovoltaic (PV) systems but include also other technologies such as wind and biogas (SALGA, 2017). SSEG customers consume electricity produced by their SSEG systems and they may also feed some of the electricity produced back into the grid. The vast majority of SSEG customers remain connected to the grid and continue to draw electricity from the grid at certain times of day when their SSEG systems produce insufficient energy for their needs.

SSEG tariffs typically have three components: a fixed charge, an import tariff and an export tariff:

- The *fixed charge* covers the demand- and customer-based costs of providing a grid connection to the SSEG customer. Because most SSEG customers remain connected to the grid and continue to draw electricity from the grid at certain times of day, the grid must still be operated and maintained. It is thus important that SSEG customers pay a fixed charge to cover the costs of operating and maintaining the grid. GreenCape (2016) recommend that the fixed charges for a SSEG customer are the same as for non-SSEG customers. The inclusion of a fixed charge in an electricity tariff is vitally important in an environment where SSEG uptake is growing as this ensures that a municipality continues to generate revenue to operate and maintain the grid.
- The *import tariff* is the consumption-based tariff that a SSEG customer pays to the municipality for the electricity that it draws from the grid. This can be at the same level as the consumption-based charge for non-SSEG customers.
- The *export tariff* is sometimes referred to as a *Feed In Tariff (FIT)*. This is the tariff that the municipality pays to the customer for electricity that the customer feeds back into the grid from its SSEG system.

As explained by GreenCape (2016), there are two approaches to setting the level of the FIT.

- Under a *cost-based approach*, the tariff is set at a level that covers the costs that the customer incurs in generating the electricity, plus an allowed return for the customer. Setting FITs on this basis requires the municipality to have a good understanding of the costs of establishing and running a SSEG system.
- Under a *value-based approach*, the tariff is based on the value that the electricity produced by the SSEG installations has to the municipal electricity grid. This is the avoided cost of electricity purchases from Eskom as well as any avoided costs due to a reduced need to expand networks. Finally, the value of positive externalities such as climate change mitigation, reduced health impacts, reduced air pollution and increased security of supply can be considered.

Note that it is ideal for SSEG customers to be on Time of Use tariffing, both for the import and export/FIT tariff. This is because SSEG often changes the pattern of consumption of

electricity from the grid: a SSEG customer on PV will use less electricity from the grid during the day/off-peak hours but often uses the same amount of electricity from the grid during peak hours.

### 3.6.2 Calculate the tariffs

Once the tariff structure is selected, the municipality must calculate what level of tariff to levy for each component of the tariff. This calculation must *ensure that the final tariff generates the revenue required* from the service so that the resulting budget is fully funded.

This is where the customer data discussed in Section 3.3 becomes relevant.

If a simple fixed charge per customer per month is applied, then calculating the tariff is simply a matter of dividing the revenue required from the customer category by the number of customers in that category, or by an alternative basis for the fixed charge (such as number of toilets for sanitation or number of bins collected for solid waste).

If consumption-based charges are to be applied then the municipality must also know the volume of service sold to the customer category; and if an IBT is to be applied then the municipality must know the volume of the service that will be sold to the customer category in each block of the tariff.

If a demand charge is to be introduced in a three-part tariff, then the municipality must know the level of peak demand by each customer category.

Obviously, the more complicated the tariff, the more complicated the calculation.

## 3.7 Test the affordability of the tariff

The tariff setting process outlined here focusses on ensuring that the municipal budget is funded and that the municipality is thus financially viable. However, it is important that tariffs are set at an affordable level. If tariffs are not affordable, customers will not pay, and cash collection rates will simply decline. Unaffordable tariffs for non-domestic customers can also make these customers less competitive and thus discourage local economic growth.

The issue of affordability is complex and there is an extensive literature on the subject. Accurate assessments of affordability can only really be obtained through willingness to pay surveys. However, rules of thumb related to the size of the monthly household bill as a percentage of household income can be a useful rough assessment of affordability. Since municipalities seldom have accurate information on the level of income of their customers, calculating the bill as a percentage of income is likely to require some assumptions about household incomes.

It is important that affordability is tested on the full municipal bill and not just on one service in isolation.

## 3.8 What to do if the bill is not affordable?

A municipality may go through the full process of setting a tariff that is cost-reflective, in that it starts with the full cost of providing a service, generates sufficient revenue to fund the budget, and transparently reflects how subsidies and other income sources are allocated, only to find that the tariff is not affordable to customers.

If this is the case, the municipality has several options.

### *Adjust the allocation of subsidies*

The municipality can allocate more subsidy to the unaffordable service. The total amount of subsidy is typically fixed, so allocating more subsidy to one service will mean allocating less subsidy to another service. This can sometimes shift the incidence of the final bill (which means making the bill lower for some customers but higher for others) and may improve affordability; but it is also possible that the affordability of the total bill may not improve. This is because the bill for one service will go down, but the bill for another will go up.

### *Adjust the size of surpluses generated*

The municipality can reduce the surplus generated on a service or customer group to lower the tariffs for that service or customer group. However, in order to ensure that the overall budget is funded, if the surplus on one service or customer group is reduced, the surplus on another service or customer group must be increased. As for adjustments in the allocation of subsidies, this may shift the incidence of the bill, improving affordability; but it is also possible that overall affordability will not improve.

### *Improve expenditure efficiencies*

Ultimately, improving affordability may be a matter of reducing the expenditure budget. This will reduce the revenue required to fund the budget and reduce the tariffs required.

Cutting the expenditure budget should be done based on proposed improvements in efficiencies to ensure that the service can still be provided effectively. Some obvious areas where municipalities might improve efficiencies over time are by reducing Non-Revenue Water and Electricity, which will reduce the bulk purchase cost; or improving cash collection efficiencies, which will reduce the debt impairment cost. Many expenditure efficiencies may take time to introduce, but it is important that municipalities do introduce these as they can progressively reduce tariffs over time.

#### **How will reducing Non-Revenue Water and Non-Revenue Electricity bring down the tariffs required?**

Many municipalities have very high levels of Non-Revenue Water (NRW), and some also have high levels of Non-Revenue Electricity (NRE). NRW and NRE can be broken down into 'technical' and 'non-technical' losses\*.

*Technical losses* are related to physical losses out of the system. In the case of water, this is due to pipe bursts and leakages or to overflows on storage tanks. In the case of electricity, these are due to resistive losses and other similar effects. The cost of real losses sits in the bulk purchases cost is a portion of the bulk purchases cost or, if a municipality is performing the bulk water function internally, a portion of the costs associated with bulk water treatment and supply. If a municipality reduces its real losses, it will lose less water and electricity from the system and the cost of purchasing water and electricity or treating bulk water will be reduced.

*Non-technical losses* refer to losses due to theft or to metering inaccuracies. In these cases, there is no physical loss of water or electricity: someone is using the water or electricity, they are just not paying for it. Reducing non-technical losses will have no effect on the cost of supplying a service, but it will have an effect on the volumes sold. Since the tariff is calculated as the revenue required divided by the volume sold, increasing the volume sold will reduce the tariff required.

Reducing technical losses will thus reduce the tariffs required because the cost of supplying the service will be reduced. Reducing non-technical losses will reduce the tariffs required because the volumes sold will be increased.

\*Note that the International Water Association (IWA) uses the term 'real losses' and not technical losses, and 'apparent losses' in place of 'non-technical losses'.

## 4 The National Treasury tariff tool

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National Treasury has produced a tool that accompanies this methodology. The tool takes the user step-by step through the tariff setting process outlined in this methodology. The approach of the new tool is largely similar to the existing Gauteng Province, GTAC, Northern Cape and SALGA tools, and these tools can still be applied by municipalities who have found them useful. The new tool aims to expand on these tools in some cases and improve user-friendliness in others.

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